

# On some forms and races of *Phragmatobia fuliginosa* (L.)

(Lep., Arct.)

BY

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(Plate I.)

In «Lambillionea», vol. 35, p. 44-47, 1935, I directed the attention to a quite forgotten article of Tutt «Notes on the habits, distribution and variation of *Phragmatobia fuliginosa*» in «The Entomologist's Record», vol. xvi, p. 58-67, 1904 (not. vol. xv, 1903, as stated by me) and compared the Dutch-Belgian forms with those described by the famous English author from his own country. I now received some months ago a few examples of the different forms occurring in Spain and sent to me by Señor R. Agenjo of the «Instituto Español de Entomología» at Madrid. The study of these most interesting forms was a good opportunity to investigate the variation of *Phragmatobia fuliginosa* more thoroughly than I had done in 1935.

Linné's original description is to be found in the thenth edition of his «Systema Naturae» (1750). It reads as follows (p. 509):

«*P. Noctua spirilinguis laevis, alis deflexis fuliginosis puncto nigro; inferioribus rubris nigro-maculatis.*

*It. zgoth.* 141.

*Uddm. diss.* 76.

*Roes. ins.* 1. *phal.* 2. t. 43.

*Wilk. pap.* 23. t. 3. a. 14.

*Habitat* in Sinapi, Rapa, Rumice.

*Larva pilosa, ferruginea.*»

His first citation is a most unhappy one. It refers to his «Wästgöta-Resa» (Stockholm, 1747). Linné describes 3 species from Gothenburg on p. 141. The first is *Brephos parthenias* L., the third a Micro, so that the second description remains for *fuliginosa*. But it is impossible to determine the insect which is described here, as



belonging to the said species<sup>1</sup>. Linné himself has dropped this citation in his *Fauna Svecica* and in *Syst. Nat.*, ed. XII.

The second citation refers to Uddman, who described in his «*No-vae Insectorum Species*» (1753) the form from Runsala in South Finland. Here flies, however, subsp. *borealis* Stgr., which does not correspond with the original description, so that this citation is also worthless for determining the typonominal form.

It is only the third citation, which fully answers to the Linnean description. Rösel (*D. monatlich herausgegebenen Insecten- Belustigungen*, 1, Tab. XLIII, fig. 4) figures a flying example with dark brown fore wings, whilst the red hind wings have a broken black band along the outer margin. (Fig. 5 represents a resting *fuliginosa*; here, of course, only the fore wings are visible, which are very phantastically coloured with red, at least in the copy of the work I could examine.) It is quite clear, that Linné made his first description of the species after Rösel's figure. The form figured belongs to the subspecies which is widespread in a great part of Western and Central Europe, so that this constitutes the typonominal one.

## 1. PHRAGMATOBIA FULIGINOSA BOREALIS Stgr.

SYNONYMY: *borealis* Stgr., *Cat.*, 2nd ed., p. 59, 1871; *fuliginosa* Linné, *Fauna Svecica*, 2nd ed., p. 308, 1761, *Syst. Nat.*, 12th ed., p. 836, 1767 (nec *fuliginosa* L., 1758); Tutt, *Ent. Rec.*, vol. 16, p. 61, 1904.

ORIGINAL DESCRIPTION: «minor, obscurior, al. post. nigris, exc. marg. int.». Habitat: «Lapland, Scotland.»

Linné's description of 1761 is not identical with that of 1758. He now wrote: «*Alae superiores* rufo-fuscescentes: punctis, duobus nigris in medio versus marginem crassiorem. *Inferiores* similis sed magis fuscescentes lunula nigra, margineque postico sanguineo», no longer describing the figure of Roesel, but no doubt actual Swedish examples.

This well-known subspecies inhabits the northern parts of Eu-

<sup>1</sup> The description reads: «*Phalaena seticornis spirilinguis*, alis incumbentibus: superioribus cinereo-nebulosis maculis duabus ferrugineis. Magnitudo Tabani. *Alae* ferrugineae. *Corpus* cinereum; in sungalae alae superioris medio ad marginem crassiorem maculae duae ferrugineae, quarum anterior minor rotunda; posterior major didyma.»



rope: Finland, Sweden, Norway and Scotland. It flies in Esthonia, but already strongly influenced by subsp. *fuliginosa* L. Peters (Lep. Fauna Estland, 1, p. 291, 1924) writes, that in the North of the country *borealis* is met with or transitions, which are nearer to that subsp. than to the type, and that he possesses a true *borealis* from Dorpat. I saw a specimen from Lechts ex coll.-Huene. Donovan mentions it also as an exceptional form from Ireland. He writes (Catalogue Macrolep. Ireland, p. 21, 1936): «A large percentage of the Cork specimens has a tendency towards the var. *borealis*, Staud., a few actually answer to the colour of this variety.» Vorbrodt (Schmetterl. der Schweiz, II, p. 222, 1914) states several localities in the higher parts of Switzerland, transitional examples even from Bern, but Osthelder (Schmett. Südb., p. 546, 1932) did not think it right after comparison with typical northern *borealis* to consider the smaller, more strongly darkened examples of higher alpine surroundings as belonging to that subspecies. It is evident that the mountain forms of Central Europe still need a careful study.

As regards the distribution in Sweden, Nordström writes (in litt.), that up to about 60° northern latitude the darkest forms of subsp. *fuliginosa* L. with transitions to *borealis* are predominant, but true *borealis* occurs among them, e. g. an example from Westgotland in the Riksmuseum at Stockholm. North of 60° *borealis* «or still darker examples» predominates. In Denmark this northern form is unknown (Hoffmeyer and Knudsen, De Danske Storsommerfugle, p. 57, 1938).

Subsp. *borealis* is characterised by its smallness (the Finnish examples I could examine measured 28-33 mm., from tip to tip of fore wings), its rather transparent and rather narrow fore wings, the ground colour of which normally varies from a dark reddish brown to blackish brown, its blackish hind wings with only a small band of red along the inner margin and with sharply contrasting red fringe along their outer margin. The black discal spots on fore and hind wings are clearly visible.

Several good figures exist of *borealis*: Svenska Fjärilar, the fine book of Nordström and Wahlgren, pl. 45, fig. 10, a Swedish example with very dark fore wings; South, Moths Brit. Isles, 1, pl. 80, fig. 2, 1907; Barrett, Brit. Lepid., II, pl. 75, fig. 1 c; Oberthür, Léop. Comp., XIII, pl. CDXXXV, fig. 3750, 1917, all three Scotch specimens; Seitz, vol. 2, pl. 16 b, fig. 3 en 4, 1910. The male, figured in Seitz, fig. 3, is remarkable for the large patch of red ad the inner margin.



According to Tutt (l. c., p. 62) the extension of the red is very rare in the ♀ and much rarer still in the ♂.

The following forms are known of subsp. *borealis*:

1. f. **nigrociliata** Tutt, Ent. Rec., vol. 16, p. 62, 1904. *Original description*: «Anderson records (*Ent.*, xiv, p. 136), that, on May 12th, 1881, he bred a specimen that had the cilia of the hind wings an intense black instead of the usual rosy-red.»

Anderson only writes, that the specimen was a Scotch one.

2. f. **typica-rufa** Tutt, l. c. *Original description*: «Them, in some examples, instead of the fore wings being of the smoky-red of the type, they are a bright deep red, approaching that of the more southern British forms.»

3. f. **rufextensa** nov. The red colour of the line along the inner margin of the hind wings has spread over a large part of the wings.

The type is a female from Muonio (Finnish Lapland) in coll.-Caron. In this example the red shows up to the discal cell, without, however, quite suppressing the black colour in that part of the wing. The name may be used for all examples of *borealis* in which the red of the hind wings is clearly extended, so that the ♂, figured in Seitz, also belong to this form.

## II. PHRAGMATOBIA FULIGINOSA FULIGINOSA L.

I have already stated Linné's original description and also showed, that it is Roesel's figure, which represents the type of the species. The form, represented by this figure, clearly belongs to the subspecies which inhabits the greater part of Central and Western Europe, though it is not the form which is as a rule one of the commonest of this subspecies.

Subsp. *fuliginosa* L. may be characterised as follows: it is larger than subsp. *borealis* (expanse of wings 31-39 mm), the fore wings are less transparent owing to a denser scaling, the hind wings are much more strongly marked with red. Tutt described the subspecies under the name of *intermedia*, but as his description covers another special form of it than the diagnosis of Linné, his name is not a pure synonym.

Subsp. *fuliginosa* no doubt inhabits a great part of Europe. In the north it reaches South Sweden, in the west Ireland and England, in the south Northwest-Spain. Its southern boundary in France is not



yet fully known. The yellow aberration figured by Oberthür (Lép. Comp., XIII, pl. CDXXXV, fig. 3747) and the normal specimen (fig. 3748), both from Lourdes (Hautes-Pyrénées) doubtless belong to it. Digne lies already within the reach of the southern subsp. *meridionalis*. Heinrich writes in his well-known fauna of this locality (Deutsche Ent. Z., 1923, Beiheft, p. 115), that the race of Digne is «at least a strong transition to *fervida* Stgr.». We must bear in mind, that *fervida* is very often misused, where it should be: *meridionalis* Tutt. And then Heinrich's statement is fully supported by two specimens I could examine. One is a true *meridionalis*, the other a *fuliginosa* of the *intermedia*-type, but of the size of the southern subspecies. Some ab ovo specimens of the Basses Alpes (locality not stated) in the collection of the Leiden Museum all belonged to *meridionalis*, which replaces subsp. *fuliginosa* along the whole French coast of the Mediterranean.

Germany is of course wholly inhabited by the typonominal subspecies. Y only saw some specimens from Auerbach in Brandenburg and from the environs of Berlin.

The same applies to the greater part of Switzerland, as is proved by a specimen from Sonzier (above Montreux) and by a very typical one from Thusis in the Grisons. But in the most favourable part of the country, in the warm valleys of Ticino, it is replaced by subsp. *meridionalis*, as is proved by a fine series from the neighbourhood of Lugano.

I saw only two Austrian examples, captured on the Bisamberg in Lower Austria. They belonged to the usual Central European subspecies. In the South of the Tyrol subsp. *meridionalis* replaces true *fuliginosa* at any rate in the lower regions, as may be concluded from Dannehl's statements, which I shall quote more fully when treating the southern forms.

How the southern limit of the typonominal subspecies exactly runs farther to the east and how far the subspecies itself extends to Eastern Europe, I am not able to say. The Dutch collections do not contain much foreign material and the circumstances are not very favourable for asking assistance of the museums abroad.

I need not give a list of figures belonging to subsp. *fuliginosa*, as it would mean to cite all illustrated text books which have appeared in Central and Western Europe! If the figure represents, however, a special form of the subspecies, it will be cited when this form is treated.



*Phragmatobia fuliginosa fuliginosa* L. is a very variable subspecies. The ground colour of the fore wings, the black markings on these wings, the ground colour of the hind wings, and especially the extension of the black colour on them, all these characters show a good deal of variation. I divide the different forms into five groups.

#### A. Ground colour of the fore wings and extension of black on the hind wings.

The ground colour of the fore wings varies from a very dark blackish brown (the *obscura*-group) through the typical dark brown (the *fuliginosa*-group) and clear brownish (the *brunnea*-group) to a

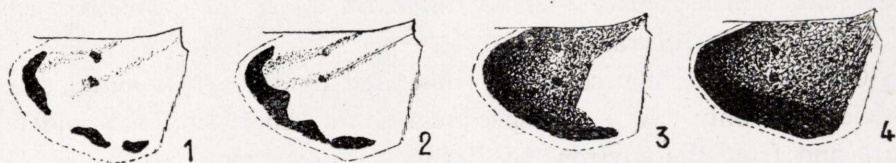


Fig. 1. *maculata*-type.—Fig. 2. *marginata*-type.—Fig. 3. *intermedia*-type.  
Fig. 4. *pseudoborealis*-type.

fine reddish-brown tint (the *rufescens*-group). These four colour-types are of course connected by intermediates, the usual phenomenon in such forms. They are doubtless dependent on temperature influences. *Obscura* is largely a form of the first generation, the caterpillars of which have been exposed to the cold of winter, whereas *brunnea* and *rufescens* almost exclusively appear in the summer generation, at least in Holland.

In the extension of the black colour on the hind wings I distinguish the following four types:

a. *maculata*-type (Fig. 1). The black colour is reduced to a row of black spots along the hind margin. It is the form which is least marked with black (apart from the very rare *totirubra* Vorbr., which will be treated separately). As a rule there remains some dark suffusion in the costal part of the wing and some of the nervures are blackened, but specimens which have as clear hind wings as typical subsp. *meridionalis* also occur.

b. *marginata*-type (Fig. 2). The black spots along the hind margin run together and form a continuous band.

c. *intermedia*-type (Fig. 3). The black colour has so much exten-



ded, that only a red triangle remains at the inner margin, reaching up to the cell.

d. *pseudoborealis*-type (Fig. 4). The hind wings are wholly black with the exception of a very narrow stripe along the inner margin.

These four types are also to a certain amount influenced by temperature. Cold causes an extension of the black colour, heat results in a reduction. It is therefore the summer generation which produces the clearest forms. Yet there is also some influence of sex, i. e. of heredity. Moreover, heat and cold seem to work independently on the ground colour of the fore wings and the extension of the black on the hind wings, so that many combinations occur and it is only by using compound names that this group can sufficiently be dealt with.

Temperature experiments will probably clear up these problems for a great deal. It is at any rate important to note, that subsp. *fuliginosa* from the extreme South of Sweden is not able to produce the clear *maculata*- and *marginata*-types (at least in nature), whereas authors, who lived in the southern part of the habitat of the subspecies (Berce, Hübner, Roesel, Esper) as a rule figured these red forms and not the darker ones.

We may classify the different forms now as follows:

a. **obscura**-group.

1. f. **obscura** Obraztsov, Festschrift Strand, vol. 1, p. 632, 1936. *Original description*: «Vorderflügel (einschliesslich Fransen) dunkler schwärzlichbraun als gewöhnlich. Hinterflügel des Tutt's *intermedia*-Typus oder gleichmässig rosa mit einzelnen schwarzen Punkten (= namenstypische *fuliginosa*-Form). Wahrscheinlich tritt diese Form auch zwischen *marginata* Tutt auf.»

Described after three specimens from the neighbourhood of Nikolajev and Cherson in the South of the Ukraine. The statement, that the fore wings are «darker blackish-brown than is usual», is of course far from sufficient, for the question remains, what is the «usual form» in the South of Russia. As the Linnean type has already dark brown fore wings, the name can at any rate only be used for extreme examples in which these wings are really blackish brown, a not very common form. I have seen a few Dutch specimens of it. The fore wings are in these examples as dark as or still darker than those of the *borealis*, figured in «Svenska Fjärilar». All have the hind wings of the *intermedia*-type and I restrict f. *obscura* Obr. therefore to this special combination. I doubt if *obscura* (in the sense



I take it) is really able to combine with the *maculata*- or *marginata*-type.

b. **fuliginosa**-group.

2. f. **fuliginosa** L. (Pl. I, fig. 4), Syst. Nat., x, ed., p. 509, 1758. The original description of Linné, which I quoted already, shows, that the typical form has dark brown fore wings, i. e. brown with a clear tint of black in it, whereas the hind wings have a row of black spots along the outer margin. In Roesel's figure, cited by the Scandinavian author, the row consists of two long spots, showing, that in reality the band of the *marginata*-type has broken into two parts. As a rule, however, the division goes much further, so that a complete row of spots results.

The form is not very common.

3. f. **typica-marginata** nov. (Pl. I, fig. 3). Fore wings dark brown as in the type, hind wings with a complete black submarginal band.

Figured by Barrett, British Lepidoptera, vol. 2, pl. 75, fig. 1, 1895. A not uncommon form in Holland. I also saw it from the Bisamberg in Austria.

4. f. **typica-intermedia** nov. (Pl. I, fig. 2). Fore wings dark brown, hind wings only with a red triangle at the inner margin.

Figures: Berge-Rebel, pl. 47, fig. 9 b, 1910; Lampert, Grossschmetterlinge und Raupen Mitteleuropas, pl. 79, fig. 12, 1907; Seitz, II, pl. 16 b, fig. 2, 1910; Spuler, Schmetterl. Europas, pl. 73, fig. 26; South, Moths Br. Isles, I, pl. 80, fig. 1, 1907; Oberthür, I, c., fig. 3748.

In Holland and no doubt all over the northern part of the habitat of the subspecies the most common form. I also saw it from Brandenburg (Auerbach and Berlin; from the latter locality delivered under the name of *subnigra* Millière!) and from Thusis in the Grisons.

5. f. **pseudoborealis** nov. (Pl. I, fig. 1). Fore wing dark brown, hind wings black with only a small stripe of red along the inner margin.

The form, which strongly reminds one of subsp. *borealis* Stgr. through its dark hind wings, is decidedly rare, at least in North-western Europe. I saw a specimen from Miño (prov. of Coruña, Spain).

Specimens, belonging to this form, are sometimes indicated as *borealis* from localities, where this Northern subspecies does not occur at all. For instance by Grabe (Int. Ent. Z. Guben, vol. 17, column 2, 1923), who mentions specimens with black hind wings from



the Ruhr-district, and by Rothke (III. Jahresbericht des Vereins für Naturkunde zu Krefeld, p. 78, 1898), who writes, that he bred an example of *borealis* in the spring of 1892 from a caterpillar which had been kept out of doors during the winter. Barret writes: «In the North of Ireland, with males of the ordinary brighter colour, are females with the hind wings almost totally dark grey.» Perhaps these females also belong here, and I strongly suspect the same of the Irish specimens, stated by Donovan as answering to the colour of *borealis* (already mentioned with this subspecies).

c. **brunnea**-group.

6. f. **brunnea** nov. (Pl. I, fig. 11 and 17). Ground colour of the fore wings clear brownish, hind wings with a row of black spots along the outer margin.

Figure: Hübner, Samml. Eur. Schm., II, fig. 143, 1818-1819, although as a rule the ground colour of the fore wings is paler. It lacks the blackish tint of the preceding group and the reddish colour of the following one. The fore wings are therefore much paler than in true *fuliginosa*. Forma *brunnea-maculata* is in Holland distinctly rare.

7. f. **brunnea-marginata** nov. (Pl. I, fig. 10). Ground colour of the fore wings clear brownish, hind wings with a complete black submarginal band.

In Holland rare. I also saw specimens from Sonzier (Switzerland) and Puente Viesgo (Santander, Spain).

8. f. **brunnea-intermedia** nov. (Pl. I, fig. 9). Ground colour of the fore wings clear brownish, hind wings black, with a red triangle at the inner margin.

The most occurring form of the *brunnea*-group in Holland, but yet far from common. I also saw a Spanish specimen from Reocín (Santander).

9. f. **brunnea-pseudoborealis** nov. Ground colour of the fore wings clear brownish, hind wings black with a narrow stripe of red along the inner margin.

I only saw the form from Villa Rutis. The red is of the pale salmon tint of f. *salmonicolor*, which is also the case in the specimen of the preceding form from the same locality.

d. **rufescens**-group.

10. f. **rufescens** nov. Ground colour of the fore wings reddish-brown, hind wings with a row of black submarginal spots.

Figure: Esper, Schmett. in Abb., vol. 4, pl. 86, fig. 2, 1706. In



Holland not so rare as the *maculata*-form of the preceding group, but far from common. I also saw a specimen from the Bisamberg in Lower Austria.

11. f. *marginata* Tutt, Ent. Rec., vol. 16, p. 64, 1904. *Original description*: «The most marked variable characters in var. *intermedia* are (1). The tendency of the red coloration to spread over the costal and central areas of the hind wings (often only tinged with red, often quite red), leaving a distinct black hind marginal band (2). The tendency for the red colour of the fringes to be carried forward upon the extreme hind margin of the wing, encroaching on the black externally, but not sufficiently to break up the continuity of the outer black band. This form, with a black outer marginal band on the otherwise red hind wings, appears to occur only as a rare aberration in the midlands, but to become a dominant form in the southern counties and to occur in Ireland... Our present impression is that it is largely a ♀ aberration in Britain. We call it ab. *marginata*, n. ab.»

Figures: Barrett, l. c., fig. 1 b; Ernst and Engramelle, Papillons d'Europe, vol. 4, pl. CLIV, fig. 200 d, 1785. As Tutt's *intermedia* is a form with red brown fore wings, his *marginata* must also be restricted to that colour form. The form is not rare in Holland, but, in accordance with Tutt's observation, more with the ♀ than with the ♂. I also saw it from Mazcuerras (Spain, prov. of Santander), again a ♀.

12. f. *intermedia* Tutt (Pl. I, fig. 6)., Ent. Record, vol. 6, p. 63, 1904. *Original description*: [The second British race, compared with the Scotch subsp. *borealis*, shows the following characteristics:]

«(1) A similarity of the sexes. (2) A greater difference between the fore- and hind wings in their tint and markings. (3) A distinct reddening of the fore wings, with denser scaling, and well-separated twin-spots. (4) The hind wings less uniformly coloured, the twin-spots as in the fore wings, the red inner marginal patch extending from the inner margin of the wing along the base of the discoidal cell, and the nervure that runs thereupon to the middle of the outer margin; and cutting back at the black inner marginal band to the anal angle, thus forming a roughly triangular red basal patch. (5) The fringes of the fore wings usually markedly redder than the ground-colour of the fore wings. (6) The red fringes of the hind wings usually sharply cut off from the dark hind marginal area. (7) The wings wider (squarer-looking) compared with their length. (8) The distinctly larger average size.»



Most of the characters mentioned by Tutt are those of subsp. *fuliginosa* in general, but those stated under (3) and (4) clearly distinguish *intermedia* from the Linnean type. It is the form with reddish-brown fore wings and the hind wings black with a red triangle at the inner margin. In Holland not rare, but of course much less common than f. *typica-intermedia*. I also saw it from Berlin (again delivered as f. *subnigra* Mill.!) and from Gijón (Asturias, North coast of Spain). Figure: Esper. l. c., fig. 1.

The total impression of the population of a certain territory largely depends on the percentage in which the different forms, treated under nos. 1-12, are represented in it. I therefore give, for the comparison with *fuliginosa* series of other countries, a review of the forms in an average Dutch series. As such I have taken the combined material of the collection of Prof. Dr. A. M. Brouwer of the Zoological Museum in Amsterdam and of myself, together a non selected series of 220 specimens of all parts of our country. I find the following figures:

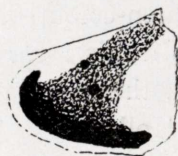


Fig. 5. — Hind wing of f. *mediofasciata* nov.

1. f. *obscura* Obr. 3.62 %.
2. f. *fuliginosa* L. 5.54 % ; 3. f. *typica-marginata* Lpk. 13.16 % ;
4. f. *typica-intermedia* Lpk. 43.17 % ; 5. f. *pseudoborealis* Lpk. 0 %.
6. f. *brunnea* Lpk. 3.18 % ; 7. f. *brunnea-marginata* Lpk. 4.08 % ;
8. f. *brunnea-intermedia* Lpk. 9.08 % ; 9. f. *brunnea-pseudoborealis* Lpk. 0 %.
10. f. *rufescens* Lpk. 5 % ; 11. f. *marginata* Tutt 6.36 % ; 12. f. *intermedia* Tutt 6.81 %.

Sufficiently long series of Central France or South Germany will no doubt provide quite different figures.

Two more forms of section A, which stand apart from those already treated, must still be discussed:

13. f. *mediofasciata* nov. (Fig. 5). Hind wings red with a black band along the hind margin and a blackish central band, containing the twin spots, from the base to the submarginal one.

In reality a deviation from the *intermedia*-type, in which there is not only a red patch at the inner margin, but also one along the costa. Type from Zeist, prov. of Utrecht (Holland).

14. f. *totirubra* Vorbrodts, Schmett. der Schweiz, II, p. 646, 1914. *Original description*: «Auf den Hfl. fehlt jede Spur der schwarzen Binden, so dass diese und auch der Hinterleib einfarbig rot sind.»



Taken at Elgg, North of Zürich. This form with unicolorously red hind wings and abdomen must be extremely scarce.

### B. Ground colour of the hind wings.

In normal specimens the posterior wings have a rather dark red ground colour.

15. f. *salmonicolor* nov. The ground colour of the hind wings salmon-coloured.

In this form the ground colour is weakened off into a fine salmon tint, the same as the one we find in some South European forms. In Holland it is very rare and is then especially met with among bred specimens of the summer generation, which are as a rule reared under more favourable conditions than those of their wild congeners, though I also possess a captured specimen. In the Spanish series were specimens from Villa Rutis (La Coruña) and Celanova (Orense). The hind wings may at the same time be very slightly marked with black and such specimens strongly resemble (but only as regards colour and markings of these wings!) the southern f. *lurida* Rothschild, better known as *fervida* Stgr. This explains, why *fervida* is sometimes given for localities, where it does not occur at all, e. g. in Rothke's publication on «Die Grossschmetterlinge von Krefeld und Umgebung», which I have already cited in the discussion on f. *pseudoborealis*. The author writes, that he once obtained «the southern var. *fervida*» in breeding a second generation in the summer of 1895 (l. c., p. 78). The Spanish specimens show, however, that the black colour may also in *salmonicolor* occupy a large part of the hind wings, for even f. *pseudoborealis* occurs among them!

16. f. *lutescens* Mosley, (And illustrated Catalogue of Varieties of British Lepidoptera, Supplement to): The Naturalist's Journal, vol. 7, p. 118, pl. XXI, fig. 4, June 1898; *flavida* Oberthür, Bull. Soc. Ent. France, 1901, p. 273; Léop. Comp., vol. 5, p. 75, 1911, op. cit., vol. 13, p. 11, pl. CDXXXV, fig. 3747, 1917; *intermedia-flavida* Tutt, Ent. Rec., vol. 16, p. 64, March 1904; *flavescens* Schultz, Ent. Zeitschr., vol. 22, p. 184, January 1909. *Original description*: «Fig. 4 represents the yellow variety, of which I have seen several specimens, and for which I propose the name *lutescens*.»

The well known, but as a rule very rare form, in which the red of the hind wings has changed into yellow, was first named by



S. L. Mosley in a rather obscure magazine on Natural History, of which he was the editor, and figured on a coloured plate. The hind wings are of the *marginata*-type, whereas those of *flavida* Obthr. are of the *intermedia*-type. Though the two names are not strictly synonymous, they must of course be considered as such, as both indicate the same type of variation. One name suffices for all the forms with yellow hind wings.

Oberthür named the form after a ♂, captured July 15th 1901 at Lourdes (Hautes-Pyrénées). He wrote: «... la plus remarquable fut un exemplaire ♂ où les ailes inférieures et le corps sont jaunes, au lieu d'être rouges. Cette variété que j'appelle *flavida*, n'a point été signalée à ma connaissance pour *fuliginosa*.» He further states, that he saw a second specimen, which was, however, trodden upon before he could pick it up. From this he presumed, that the form was not rare at Lourdes. It has, however, always remained the only example Oberthür has ever possessed of the yellow *fuliginosa*. He repeated the story of the capture in vol. 5 of his famous *Lépidoptérologie Comparée*, p. 75 (1911). This specimen is at the same time the only one which is mentioned for the whole of France by Lhomme in his «Catalogue des Lépidoptères de France et de Belgique», vol. 1, p. 132 (1923-1935).

Tutt writes (l. c., p. 64): «It may be worth noting, here, that an occasional rare aberration of the *intermedia* race [i. e. subsp. *fuliginosa*!] occurs in our Islands, in which the red of the hind wings is changed to yellow. Pitman records (*Ent. Rec.*, x, p. 48) that he bred two examples from eggs laid by a ♀ taken wild near Wisbech, in which the hind wings are «yellowish-buff» where they ought to be pink; Dillon records (*Ent.*, xxviii, p. 90), one at Clonbrock; Pickard bred one at Walsingham (*Nat. Hist. Trans. North. and Durham*, xii, pt. 1, p. 68).» As he thought, that Oberthür's *flavida* belonged to «the southern France form», that is to subsp. *meridionalis* Tutt, he named the corresponding form of his race *intermedia* (= subsp. *fuliginosa*): *intermedia-flavida*. Oberthür's figure 3747 (*Lép. Comp.*, vol. 13) shows, however, that the Lourdes specimen was a true representative of subsp. *fuliginosa*, so that, even if Tutt had not overlooked the publication of his compatriot Mosley, his name would have become a pure synonym. Incidentally it may be observed, that the yellow form has not yet been met with among subsp. *meridionalis*, but should this happen, then there is not the least need for the creation of a new name, as the principle of the variation is the same.



Barrett (Brit. Lep., vol. 2, p. 275, 1895) does not mention any British example with yellow hind wings. South (Moths Brit. Isles, 1, p. 155) only states: «A yellow aberration has been recorded.»

O. Schultz (l. c., p. 184) writes, that the form with yellow hind wings and abdomen occurs very rarely among the normal one, but he gives no localities. It is at any rate a great rarity in Germany. Of the local faunas I could consult, only one states this form, viz. the excellent work of Urbahn on the Macrolepidoptera of Pommern (Stett. Ent. Z., vol. 100, 1939). On p. 335 (separate p. 151) one specimen is mentioned, taken in 1923 near Stettin.

### C. Markings of the fore wings.

The markings on the fore wings are very simple. They consist of one (typical, according to Linné's description) or two black spots on the discoidal nervure, which are nearly always clearly separated.

17. f. **impuncta** Lempke, Tijdschr. voor Entom., vol. 81, p. 270, 1938. *Original description*: «Fore wings without black spots at the end of the cell.»

Far from common, I know only of some Dutch specimens.

18. f. **juncta** nov. The two black discal spots on the fore wings are joined by a dark line along the discoidal nervure.

No doubt a rare form. According to Tutt (l. c., p. 62), the twin-spots are also occasionally joined with subsp. *borealis*, at least in Scotland.

19. f. **punctata** Salerou (Fig. 6 and Pl. I, fig. 7). Lambillionea, vol 35, p. 86, May 25, 1935; *kolari* Diószeghy, Verh. und Mitt. Siebenb. Ver. für Naturwissensch. zu Hermannstadt, vol. 83-84, 1933-34, p. 127, 1935. *Original description*: «Aux ailes antérieures en plus de la tache virgulaire noirâtre placée à l'extrémité de la cellule, une tache noirâtre, vers le bord de l'aile, face à l'échancrure de la cellule.»

The form was described after 2 examples, taken at Giverny (Eure, France). Diószeghy, who made his description after specimens from Ineu (Borosjenő, Romania), wrote: «Sie weicht von der Stammform durch die graubraunen oder schwarzen Flecke am distalen Teile der Vfl. ab. Diese Flecke sind grobe Keil-oder Pfeilflecke, 1-5 an Zahl. Sie können gesondert oder auch leicht zusammenhängend nahe der Saumlinie auftreten; der letztere Fall ist seltener.» The concerning



volume of the Transylvanian periodical was published in 1935 without indication of a more exact date.

The form with dark markings along the hind margin of the fore wings is rather rare in subsp. *fuliginosa*. Besides some Dutch specimens I also saw one from Auerbach in Brandenburg.

20. f. *lineata* Hackray, Lambillionea, vol. 39, p. 94, May 1939; *marginata* Hackray, op. cit., vol. 38, p. 201, 1938 (nec Tutt, 1904). *Original*

*description*: «Aux ailes antérieures, un trait noir bien marqué, partant de la côte, atteint le bord interne parallèlement au bord externe.»

The form with a complete line from costa to inner margin of the fore wings must be very rare. The type was taken at Verviers.

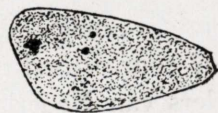


Fig. 6. — Fore wing of f. *punctata* Salerou.

#### D. Transparency of the hind wings.

21. f. *posthyalina* nov. (Pl. I, fig. 5). The basal part of the hind wings up to the twin spots scaleless and completely transparent; twin spots clearly marked; along the hind margin a black submarginal band; fringes red, sharply contrasting.

I know this form only from Reocín (Santander, Spain).

#### E. Variation in the nervures of the hind wings.

22. f. *furcula* Bryk, Entom. Tidskr., vol. 44, p. 116, 1923. *Original description*: «Das Hfl.geäder ist bei diesem niedlichen Bären variabel. Wie bei manchen Tagschmetterlingen kann das aus der vorderen Diskusecke entspringende Rippenpaar sich bisweilen gabeln; und mir scheint fast, dass dies vielleicht ein Rassenmerkmal für *fuliginosa* ist. Während bei schwedischen Stücken (12 Ex.) in der Mehrzahl (10:2) dieses Rippenpaar direkt aus dem Diskus entspringt, oder sich unmittelbar vor den Diskus gabelt, so zeigen Stücke deutscher Provenienz (Cassel) eine sehr starke weit vom Diskus entfernte Gabel. Nach freilich so geringem Material will ich nicht behaupten, dass dies durchaus ein Rassenmerkmal wäre, zumal es sich doch oft um Ex-larva Stücke handelt, und gerade die Zucht oft



Geäderformen begünstig. Jedenfalls sollen Exemplare mit ausgeprägter Rippengabel den Namen *furcula* nova erhalten.»

I do not believe, that the nervulation of the hind wings has much value for the identification of the races or subspecies of *Phr. fuliginosa*. Snellen, the well-known Dutch Lepidopterist (1832-1911), who of course used the nomenclature of Herrich-Schäffer, writes (Vlinders van Nederland, Macrolepidoptera, p. 166, 1867): «in the hind wings eight nervures, nervure 3, 4 and 5 from the lower angle of the discoidal cell, 6 and 7 from one point.» This is in accordance with the majority of Bryk's specimens from Sweden, but quite contradictory to those from Cassel! When I examine, however, my own series of Dutch specimens, I observe, that as a rule 6 and 7 (= III<sub>1</sub> and II, according to Spuler, or M<sub>1</sub> and R, according to Comstock) come from one point (the upper angle of the cell), but in some examples they are forked at a smaller or greater distance from the cell. With the Spanish specimens I saw, only very few had 6 and 7 forked at a small distance from the cell. The same holds for the specimens of subsp. *meridionalis* which I could examine.

23. f. **atroph**a Bryk, l. c. *Original description*: «Bei einem Exemplar aus Cassel (c. m.) ist die *hinterste der drei Rippen* am hinteren Diskusende *beiderseits atrophiert*, sie soll f. *atroph*a heissen.»

I have not seen a specimen in which nervure 3 of the hind wing (= N<sub>1</sub> ou Cu<sub>1</sub>) is «atrophiert», i. e. has got lost (vide F. Bryk, *Parnassius apollo* L. und sein Formenkreis, p. 104, 1915).

Barrett (l. c., p. 275) mentions another form which cannot be classified under any of the above headings. He writes: «A very curious variety has been taken near Belfast by Mr. C. A. Watts, a male with fore and hind wings *whitish*, very nearly transparent, and altogether contrary to the general tendency of its variations.» Possibly a pathological form.

In the greater part of its habitat subsp. *fuliginosa* produces two generations per year, although in favourable seasons or in warmer localities no doubt a partial third brood may occur. As to the differences between these generations little has as yet been published. In Holland the summer brood is on an average perhaps a little larger than the first generation, and on an average paler through the presence of specimens with red-brown and clear brownish fore wings, but I should first like to see sufficiently large series of captured



specimens of both broods before pronouncing a definitive opinion. There is at any rate not a clear seasonal dimorphism as for instance with some of our species of *Pieris* or *Drepana*.

Lumma (Int. Ent. Z. Guben, vol. 27, p. 422-426, 1934) writes, that in 1933 he obtained three successive broods from caterpillars collected in the preceding autumn in East-Prussia. The second generation was clearly larger than the first and very variable (about in the same directions as in Holland), whereas the autumnal specimens resembled the first brood much. But as his conclusions are again based on bred series, they have only a rather limited value.

Galvagni and Preissecker (Die lepidopterologischen Verhältnisse des Niederösterreichischen Waldviertels, II, in XXIII. Jahresbericht des Wiener ent. Ver., p. 150, 1913) write, that the moth has two generations in the wooded quarter of Lower Austria. The specimens of the spring brood are smaller, more thinly scaled, of a darker colour and with extended black markings on the hind wings. The summer brood is larger, paler and more vividly coloured, «without reaching, however, the beautiful rosy-red of the southern var. *fervida* Stgr.»

These few examples show at any rate, that a tendency for seasonal dimorphism exists, and that it is more clearly developed in surroundings, where the difference in temperature between spring and summer is larger than in our Atlantic climate.

We must now discuss a form, which is in many respects a transition to the next subspecies:

f. *approximata* Tutt, Ent. Rec., vol. 16, p. 64, 1904. *Original description*: «In the most favourable habitats of the species in our southern counties, the tendency for the hind-marginal band of *ab. marginata* to become broken into distinct spots is more marked. The features of this race compared with those of *intermedia* may be noted as: (1) A more marked sexual difference, the ♂s broader and squarer-winged than the ♀s. (2) An entire difference between the fore- and hind wings in their tint and markings. (3) Ruddy fore wings, densely scaled. (4) The hind wings rose-red (the colour of the fringes), the black in twin-spots large and well-developed, the red on the extreme hindmargin developed so as to narrow and break up the black hind-marginal band into a row of isolated marginal spots, the nervure forming the lower edge of the discoidal cell and its branches black. (5) The fringes of the fore wings as in *intermedia*. (6) The red fringes of the hind wings uniform in tint with the ground colour



of the wing. (7) The shape of the wings as in *intermedia*. (8) The size about the same as that of *intermedia* = var. *approximata*, n. var.»

Tutt considered the form as of the same systematic value as *borealis*, i. e. as a subspecies, but he was not quite certain about this, as follows from an observation on p. 63, where he writes that his var. *intermedia* «is also so very generally distributed among the *approximata* form in the southern counties, as to lead one to look upon the latter, at least in Britain, rather as an aberration of the *intermedia* race than the dominant form in these counties, a conclusion probably erroneous...»

The form is no doubt strongly related to f. *rufescens* Lpk. of subsp. *fuliginosa*, i. e. to one of its clearest forms, with red-brown fore wings and a row of black spots on the hind wings, but there are some important points of difference in the description of *approximata*, viz. (1) and (3). In f. *rufescens* Lpk. the shape of the wings is the same as in all other forms of subsp. *fuliginosa*, rather variable, but not in a sexual way. And the ground colour of its fore wings is not «ruddy», i. e. red or reddish, but redbrown. An excellent figure of an *approximata*-form is given by Oberthür (Lép. Comp., vol. 13, pl. CDXXXV, fig. 3749) after a specimen from Lyndhurst (Hampshire) ex coll. Howard Vaughan. The colour of the fore wings is red, with only the slightest tint of brown in it, and therefore of a darker hue than that of the hind wings. These are not of the «*maculata*-type» as with Tutt's typical *approximata*, but they have a continuous black band along the hind margin (f. *approximata-marginata* nov. f.). This is almost certainly the darkest hind wing form, that *approximata* is able to produce, in this respect agreeing with subsp. *meridionalis*.

Barrett (l. c., p. 274-275) writes of the form: «In the South and South-East of England, the general colour is bright red, sometimes even a rich ruby-red, the hind wings being very rosy; and the dark band near the margin of the hind wings is broken up, in many specimens, into a series of separate cloudy spots.» In his figure (pl. 75, fig. 1 b) the fore wings are not red enough, so that it is only a *fuliginosa* f. *rufescens* Lpk. But this is perhaps due to the executions of the plates, which is less fine than we are accustomed to at present.

It seems, however, that English collectors consider all specimens with spotted hind wings as «the Southern type», indifferently whether the fore wings are red brown or reddish. Mosley figures at any



rate on the same plate as his f. *lutescens*, a specimen of this southern form with clear red brown fore wings and spotted hind wings (fig. 1) and in fig. 2 an example of the «Lancashire type» in which the anterior wings are of exactly the same tint, whereas the hind wings are of the *intermedia*-type, thus figuring a typical *intermedia* Tutt.

Forma *approximata* is no doubt an extreme development of the red brown *fuliginosa*-form with spotted hind wings, caused by the favourable weather conditions of South England. It might therefore also be expected in the warmer parts of France, but it seems not to occur at all in that country. Oberthür, who possessed material from different French localities and who knew the form of Brittany of course well, wrote (Lép. Comp., vol. 5, p. 73-74, 1911): «Il y a dans ma collection une nombreuse série de *Fuliginosa* anglaises. Celles que W. Reid m'a envoyées du Nord de l'Ecosse sont plus petites, avec l'aspect général moins rouge que les *Fuliginosa* du Sud de l'Angleterre, lesquelles sont tout à fait analogues à celles de France et souvent même plus grandes et d'une teinte rouge plus vive et plus éclatante.» So he did not know the red *approximata* from France, where *fuliginosa* develops in the favourable localities of the South into another direction, that of subsp. *meridionalis*. We must therefore look upon the beautiful *approximata* as a special South English oecological form. If it really merits the rank of a race must be made out by the British lepidopterists.

Sibille describes his f. *clara* (Lamb. 1927, p. 74) as follows: «La bordure noire des ailes postérieures est constitué par 5 points noirs.» The type was taken at Virton (in the South of Belgium). Mr. L. Berger has discovered that the Sibille collection remain guarded into Lovaina University and he has been able to examine the specimen which must be considered as type. «The fore wings are of a red tint a few rose, and also the thorax and the tegulae. The hind wings are coloured of a rose a few salmon. It has no more than three very little marginal spots, (no five how Sibille write). In general manner, exemplar very clear in both wings.» From this description result that f. *clara* Sibille is a synonymy of f. *approximata* Tutt!

This form is not, then, genuine exclusively from Southern England, and it may be found also in the Continent.



### III. PHRAGMATOBIA FULIGINOSA MERIDIONALIS Tutt.

The original description of this subspecies reads as follows (Ent. Rec., vol. 16, p. 64, 1904), compared with «var.» *approximata* Tutt:

«♂. The fore wings, though not of a lighter, are of a browner tint, the red fringes standing out in more marked contrast, with the duller ground colour of the wings in a manner rarely seen in British examples. The red colour of the hind wings a clearer pink, less tinged with black around the twin-spots (occasionally with a tendency to a salmon-coloured tint), the marginal spots usually fairly large and well-marked. ♀. Larger, the fore wings very much darker, more densely scaled than the ♂. The hind wings and abdomen of a bright crimson-pink; the marginal spotting intensely black.»

The description was drawn from a large bred series, reared in England by Bacot, the parents of which were captured at Pegomas near Cannes. When I compare the specimens I can examine at present, and which are taken at light in France, Switzerland and Italy, with Tutt's description, there are some points of difference. There is no such strong sexual difference in ground colour of the fore wings and in size, and the fringes of the anterior wings do not contrast sharply with the ground. These were possibly characters peculiar to the special brood and due to hereditary influences.

But apart from these differences there is not the slightest doubt, that *meridionalis* is a clearly separable race and that Tutt was perfectly right in establishing it. It is incomprehensible that it has, in ignorance of the English publication, not yet received another name. The only explanation is, that the specimens are regarded as belonging to *lurida* Rothsch. (= *fervida* Stgr.), a determination, which is absolutely incorrect.

The differences which strike me when I compare the Southern form with our typonominal *fuliginosa* are: 1. *meridionalis* (Fig. 7 and Pl. I, fig. 14 and 16) is distinctly larger than subsp. *fuliginosa*. The specimens I could examine (excluded a few bred ones) measure 33-39 mm, on an average 35.6 mm, against *fuliginosa* 31-39 mm, average 34.1 mm. 2. The hind wings are of a fine clear reddish tint, lighter than in subsp. *fuliginosa*. The large black spots along the hind margin and the twin spots sharply contrast with the ground colour. Sometimes one or two nervures near the twin-spots are blackened, but



otherwise no dark markings exist on the posterior wings. These two characters clearly distinguish *meridionalis* from the typonominal subspecies.

As regards the ground colour of the fore wings, in the male they are as a rule clear brownish (about as in subsp. *fuliginosa* f. *brunnea*), in the female they are somewhat darker and closely resemble those of the typical form of subsp. *fuliginosa* as described by Linné. So doubtless a sexual difference in the ground colour exists, but it is not so strong as Tutt's description indicates it.

At first I had only one specimen of *meridionalis* at my disposal, captured at Marina di Massa in Italy, on the coast of the Mediterranean between Spezia and Leghorn, and this is figured on Pl. I, fig. 16. This specimen, a ♂, is a small one, however, not larger than a typical *fuliginosa*. Yet it shows the characteristic markings of the hind wings very clearly and the difference with the «*maculata*-type» of *fuliginosa*, figured below it, is very striking<sup>1</sup>. Later I saw some more specimens in the Dutch museums, but the most interesting was a very fine *meridionalis* series in the collection of Mr. Caron. But photographic plates were no longer to be had in Holland and so I was unable to figure some more typical examples of this beautiful southern subspecies. But, as the plate is only in black and white, the ♂ type of *fervida* (fig. 19) with its larger black spots may also serve to give an excellent idea of true *meridionalis*.

The distribution of the subspecies is still very unsufficiently known, but from the few facts we know at present, it is clear, that *meridionalis* is the representative of *fuliginosa* South of the Alps. Oberthür has received it from Algeria and in a special form (*Kroumira* Obthr.) from Tunisie. Tutt mentions it from Cannes and Pegomas in the South of France. I saw French specimens from Digne, the Basses Alpes without further locality, Antibes and Eviva on Corsica. Further I could examine examples from the South of Switzerland (Calprino near Lugano in Tessin, a very typical series), from Italy (Alta Valle Roia and Tenda in the Alpes Maritimes, Genua, Laigueglia and Marina di Massa) and in a special colour form from Spanish Marocco (Xauen, El Ajmas). The subspecies doubtless occurs along the greater part of the Mediterranean coast in Spain,

<sup>1</sup> When subsp. *fuliginosa* lives under very favourable conditions, it is also able to produce examples closely resembling this small *meridionalis* or even identical with it!



but I have not seen material. There are in South Europe of course also many localities, where transitions between both subspecies, *fuliginosa* and *meridionalis*, occur. I saw such specimens, not larger than subsp. *fuliginosa*, and the hind wings not so heavily spotted as in subsp. *meridionalis*, but of the same clear type, from Vence in the Alpes Maritimes (France) and Cercedilla (Estación Alpina, 1,500 m, Prov. of Madrid), but in both cases only one specimen, so that it is not possible to say much about the population of these two localities<sup>1</sup>. I mentioned the mixed character of the Digne population already with subsp. *fuliginosa*.

As f. *lurida* Rothsch. (*fervida* Stgr.) (Pl. I, fig. 19-21) is nothing but a special form of subsp. *meridionalis* and in literature no doubt often confounded with it, we may add all localities cited for this form to the habitat of subsp. *meridionalis*, so the South of Spain, the South of the Tyrol, Albania, Sicily.

As to the variability of subsp. *meridionalis*, this is almost as strong as with the typonominal form, though, of course, the darker hind wing forms do not occur with it. In its typical form, as described by Tutt, the fore wings are clear brownish with the ♂, dark brown with the female, the hind wings clear reddish with a row of black large spots along the hind margin.

It is without doubt highly desirable to use the names of the forms of subsp. *fuliginosa* as much as possible for the other subspecies too. I saw the following ones of *meridionalis*:

a. f. **punctata** Salerou. Specimens with one or more blackish spots along the hind margin of the fore wings seem to be much less rare than with subsp. *fuliginosa*. Calprino, Genua, Laigueglia, Alta Valle Roia.

b. f. **rufescens** Lpk. Specimens with really redbrown fore wings (and hind wings of the for *meridionalis* characteristic *maculata*-type) seem to be rare among the southern form, but my experience with this subspecies is of course limited. I saw a fine ♀ from Genua.

c. f. **salmonicolor** Lpk. Tutt stated already in his description of *meridionalis*, that the hind wings have sometimes a tendency to a salmon-coloured tint. I saw a fine ♂ from Calprino and another from Laigueglia.

<sup>1</sup> The typical form of *fuliginosa* is mentioned by Rothschild as far South in Spain as San Ildefonso, Segovia (1 ♂, Nov. Zool., vol. 17, p. 115, 1910).



Special forms of subsp. *meridionalis* are:

1. f. **meridionalis-marginata** nov. Specimens of *meridionalis* in which the spots along the hind margin of the posterior wings coalesce to form a continuous band. Calprino near Lugano, ♂ and ♀.

2. f. **subnigra** Millière, Lépidoptérologie, fasc. 6, p. 4, pl. VIII, fig. 7 (reprint from Annales des Sciences Naturelles de Cannes, année 1880<sup>1</sup>). *Original description*: [After having discussed *placida* Friv. and *fervida* Stgr., the author continues:] «La *Subnigra*, fig. 7, est, peut-être, la plus remarquable de ces trois variétés; soit par sa coupe d'ailes très aiguës à l'apex, soit par sa couleur d'un brun marron foncé aux supérieures, soit enfin par l'étroitesse de la subterminale noire des inférieures.

Cette Var. *Subnigra* est, ainsi que le type, assez rare à Cannes où je la prends au réflecteur. Elle paraît ne pas exister à la montagne où cependant le type et la Var. *Fervida* qui se montrent deux fois en été, à Saint-Martin-Lantosque, sont fort abondantes.»

In a note Millière states: «Elle m'a semblé plus particulièrement commune dans l'Ariège, et aussi à Amélie-les-Bains où, en 1864, je l'ai obtenu *ex larva*.»

The name is often misinterpreted and used for specimens of subsp. *fuliginosa* with quite typical dark brown fore wings. It is in reality a special *meridionalis* form, very probably only occurring with the ♀. We saw already, that in this sex the anterior wings are darker than in the ♂. In *subnigra* this tendency has still further developed, so that the fore wings are blackish brown, darker than in most of our usual specimens of subsp. *fuliginosa*. The red of the hind wings has also a darker tint than in typical *meridionalis* and they are in Millière's figure (and description) of the *marginata*-type. But otherwise it is a very distinct representative of the southern form: it is large (span of the specimen figured 36 mm) and the hind wings

<sup>1</sup> The «Lépidoptérologie» contains 7 fascicules, no. 1 reprinted from Ann. Soc. Sc. Nat. Cannes, 1875; no. 2 from Ann. Soc. Ent. Belg., 1877; no. 3 from Mém. Soc. Sc. Nat. Cannes, vol. 7, 1878; no. 4 from Ann. Soc. Linn. Lyon, 1878; no. 5 from Ann. Soc. Sc. Nat. Cannes, 1879; no. 6 and 7, also from the last periodical, 1880. It was issued at Cannes in 1881. Each fascicule begins with page 1, the plates, however, are numbered from 1 to 10. I was unable to consult the Ann. de Cannes themselves, as they are not in a public Dutch library.



show the characteristic *meridionalis* features: plain red with the exception only of the twin spots and the marginal band. We may neglect the third character indicated by Millière, that of the pointed fore wings, a character of minor importance, as the wing shape is rather variable in nearly all *fuliginosa* forms.

Y can only add one locality to those stated by Millière himself: Antibes near Cannes, from where I saw a ♀. In this specimen the band is broken into separate spots.

3. f. *lurida* Rothschild, Nov. Zool., vol. 17, p. 115, 1910; *fervida* Stgr., Cat., 2nd ed., p. 59, 1871 (nec Walker, List specimens Lep. Insects Br. Mus., III, Lepid. Heterocera, p. 612, 1855).

*Original description of Rothschild:* «I have given the subspecific name of *lurida* to what was named *P. fuliginosa fervida* by Dr. Staudinger in the second edition of his *Catalogue of Palaearctic Lepidoptera*, because Walker had previously (1855) used name *fervida* for another quite different species of *Phragmatobia* from Central America.»

*Original description of Staudinger:* «major, dilutior, al. ant. rufescent., al. post. miniaceis mac. paucis nigris.» As habitat is given: «Eur. m.»

In 1901 (Cat., 3rd ed., p. 365) the same description is given, but the form is now also mentioned from Tura (Transcaspica, Achal Tekke Territory with Askabad, Merw, Krasnowodsk) and Millière's figures 5 (*placida*) and 6 are cited.



Fig. 7. — Typical hind wing of subsp. *meridionalis* Tutt.

Tanks to the kindness of Herrn A. Bang-Haas I was able to examine the 3 types of *fervida* from the Staudinger-collection, 1 ♂ and 2 ♀♀. They are figured, pl. I, fig. 19, 20 and 21. The male (fig. 19) is the only one which is provided with a locality: Granada, 13-8, the larger female (fig. 20) has only a label with date: 4-4, the smaller one (fig. 21) is not provided with indications as regards time or place. I drew the following description from them:

Span of the ♂ 32 mm, of the females 38 and 36 mm. Ground colour of the fore wings a very fine pale brown, somewhat yellow tinted, in the ♂ and the larger female (to my eyes; an expert, whom I asked for his opinion, called it gold ochre), in the smaller ♀ they are a little darker (but always paler than in typical *meridionalis*;



called by my expert: dark gold ochre)<sup>1</sup>, the discal spot (or spots) sharply contrasting. The hind wings are salmon coloured, the twin spots and the submarginal spots sharply contrasting. In the male and the smaller female the spots along the hind margin are very small, but in the larger female they are as large as in many typical examples of *meridionalis*.

Forma *lurida* may be characterized as a special form of subsp. *meridionalis*, in which not only the hind wings are of a paler tint (thus agreeing with f. *salmonicolor* Lpk.), but in which the ground colour of the fore wings is also clearly paler. All specimens of subsp. *meridionalis* showing these two characters must be considered as f. *lurida*. As a rule the submarginal spots are also much smaller, but, although Staudinger states this character in his description, his one female type shows, that exceptions are permitted.

It is remarkable, that Staudinger calls the fore wings «rufescens», whereas his three types do not show the slightest tint of red in their ground colour. Yet specimens in which the anterior wings show a clear reddish tint, do exist. I saw them from Corsica. But in these specimens too, the wings remain paler than in typical *meridionalis* and of quite another tint than the hind wings.

The best figure of *fervida* is that of Millière (l. c., pl. VIII, fig. 6). Yet it is not good. The red colour of the hind wings is not the fine salmon tint of Staudinger's form, but much darker, more purplish red. It is a puzzle how Staudinger could also cite Millière's figure 5 for his *fervida* in 1901! The figure is that of a typical *placida* Friv., with the red discal spot on the fore wings, the ground colour of which is as dark as in our typical *fuliginosa*! The only explanation is, that the hind wings (which are not salmon coloured, but normally red!) have only a few black spots along the hind margin. The figure of *fervida* in Seitz (pl. 16 b, fig. 6) is not this form.

Forma *lurida* is nothing but a special development of subsp. *meridionalis* in the direction of a pale ground colour combined with a reduction of the markings on the hind wings. That explains why *lurida* is met with among typical *meridionalis* and why perfect transitions occur. I saw a very fine one from Laigueglia in Western Italy. In this specimen the hind wings are of a beautiful salmon

<sup>1</sup> In the photo the fore wings of fig. 6 are much too dark. Whereas they look as dark as those of the Dutch specimen of fig. 3, they are in reality paler than those of the Italian *meridionalis* of fig. 1.



colour with very small black spots along the hind margin, thus representing the most distinct *lurida*, but the fore wings are dark brown as in the typical female of *meridionalis*.

I cited the communication of Millière, that *lurida* and «the type» (which means on doubt typical *meridionalis*) fly together at Saint-Martin-Lantosque. The same may be concluded from Dannehl's statement on the forms of *fuliginosa* in South Tyrol (Ent. Zeitsch., vol. 42, p. 88-89, 1928), where he writes, that *fervida* and transitions are, especially in the summer brood, common. His assertion, that these transitions resemble f. *pulverulenta* Alph., makes it sure, that they are pure *meridionalis*. (It would, of course, be very interesting to study important series from his Tyrolese localities.)

That *lurida* especially appears in the summer brood, as Dannehl writes, strongly suggests, that it is an oecological form, caused by higher temperature. This is confirmed by the breeding result of Ovenden, communicated by Tutt in his paper on *fuliginosa* (l. c., p. 65). Bacot reared in July, 1903, a brood from the Pegomas ♀ of *meridionalis*. Descendants of this brood were reared by Ovenden in September-October 1901, «carefully murtured in a greenhouse where the temperature was always pretty high». The specimens obtained showed «markedly a general leaning to the *fervida* form.», they had paler-coloured fore wings, more salmon coloured (or, as Tutt calls it, miniaceous) hind wings and smaller hind-marginal spots<sup>1</sup>.

Its oecological character is also strongly supported by the fact, that most localities which are cited for *lurida* are situated in the hottest parts of South Europe. Whether it becomes racial in some parts of its habitat I am unable to say as I have not seen long series from any southern locality. Tutt only writes (l. c., p. 59 and 63), that the form was captured in numbers in August, 1901, at the electric lamps in the squares of Turin.

Seitz (Grossschm., vol. 2, p. 79, 1910) mentions the form from «South Europe, Turkestan, North Africa, local», Zerny (Eos, vol. 3, p. 435, 1927) from Albarracín (prov. of Teruel) where Predota collected a specimen on June 2, and from the Barranco del Algarrobo near Algeciras (Iris, vol. 41, p. 129, 1927), where one specimen was

<sup>1</sup> Bacot reared at the same time a brood, the larvae of which were placed out of doors for a month. The moths resulting from them were much smaller, the scaling much less dense, etc., resembling the south English f. *approximata* very much. This points to the conclusion, that *meridionalis* itself is also for the greater part due to favourable climatic circumstances.



collected in May, 1925. Rondou writes of the Pyrenees: «Çà et là avec le type» (Ann. Soc. Ent. France, vol. 101, p. 235, 1932). Bytinski-Salz mentions *lurida* as rare from Aritzo on Sardinia, the only form of the species met with (Int. Ent. Z., vol. 28, p. 98, 1934). Millière (Lépidoptérologie, fasc. 6, p. 5, [reprint]) says of *fervida*: «Cette race n'est pas rare sur le littoral méditerranéen et dans nos montagnes à mille mètres d'altitude environ.» Rothschild (Nov. Zool., vol. 17, p. 115, 1910) possessed *lurida* from Antibes (French Riviera, April 1904), Entrevaux (Var, July 1903), Hyères, Bordighera (It. Riviera, March 23-29), Taormina in Sicily, Ferghana, Chasarowka. Schwingenschuss (Zeitschr. Wiener Ent. Ver., vol. 27, p. 248, 1942) writes of Sicily: «Near Petralia sottana and Mezzoiuso several specimens, in Mistretta common.» The opinion of Lunak, also cited by him, that the type of *lurida* has ochre-yellow fore wings and pale red hind wings, is, of course, not correct. Very interesting are Lunak's further remarks, that he almost intends to consider *lurida* a heat form (i. e. a pure oecological form!) and that a specimen, sent to Philipps, was determined by the latter as belonging to f. *pulverulenta* Alph., «which is larger than *fervida* and has a darker colour». This proves, that not all Sicilian specimens are true *lurida*, but that they are either partially referable to typical *meridionalis* or are transitions. (The Asiatic *pulverulenta* resembles *meridionalis* much, but is not identical with it<sup>1</sup>.) Stauder (Entom. Anz., vol. 10, p. 105, 1930) says, that most specimens in the Illyro-Adriatic territory are transitions to *lurida* (which means, very probably, that they are true *meridionalis*), but that typical *lurida* is known from Trieste, Brioni, Fiume, Dalmatia and Herzegowina (for the greater part derived from other sources from literature) and that the specimens from the Alpine parts of the territory are identical with those from northern localities (i. e. with subsp. *fuliginosa*). A specimen from Spalato had very dark fore wings and very slightly spotted hind wings (probably a *meridionalis* f. *subnigra* Mill.). Schwingenschuss and Wagner write (Z. Oest. Ent. Ver., vol. 12, p. 72, 1927), that the examples of Gravosa (Dalmatia) are «strong transitions to *fervida*», so probably typical *meridionalis*. Rebel and Zerny (Denkschr. Akad.

<sup>1</sup> There can be no doubt, however, that both subspecies are strongly related. The material of *pulverulenta* I can dispose of, is too small in number to study the question more thoroughly.



Wissensch. in Wien, mathem.-naturw. Klasse, vol. 103, p. 119) mention some localities from Albania.

I have consulted only a part of the literature on South Europe, but the above suffices to give some idea of the distribution of *lurida*. As I observed already, the data, collected from literature, can, however, only be used with great caution, as none of the authors knew of the existence of subsp. *meridionalis*. It may be taken for certain, that many of the *lurida* specimens cited did not belong to that form at all, but were either true *meridionalis* or one of its other forms.

Extremely doubtful are Vorbrodt's statements of Swiss localities. The definition which he gives of *lurida* (Schmett. Schweiz, II, p. 222, 1914) excellently suits for *meridionalis*. The Bechburg (near Solothurn) and Elgg (North of Zürich) are of course out of the question, as they are situated far north of the habitat of *meridionalis*, but Locarno and Lostallo are very probably incorrect too. In his «Tessiner und Misoxer Schmetterlinge» (Mitt. Schweiz. Ent. Ges., vol. 14, p. 372, 1937) several localities are mentioned with the assertion, that *lurida* is the «principal form in the Insubrian valleys up to 700 m», but I happen to have before me the series of Calprino, collected by Mr. Caron, and also cited by Vorbrodt as *lurida*. They are, however, the most typical *meridionalis* one can imagine!

It will be clear, that the subject of the distribution of f. *lurida* Rothsch. must be examined again in the light of the data I have been able to procure.

4. f. **extrema** nov.; *fervida* Seitz, Grossschm., vol. 2, pl. 16 b, fig. 6, 1910 (nec Stgr.). Fore wings pale reddish-yellow, almost of the same tint as the hind wings, which are very feebly spotted.

5. f. **kroumira** Obthr., Lép. Comp., vol. 13, p. 11, pl. CDXXXV, fig. 3751, mars 1917. *Original description*: fails. Oberthür only writes: «Je crois utile de faire figurer... la forme d'Aïn-Draham, avec le nom de *Kroumira* Obthr.»

The figure, which is of course a very fine one, shows a form, which belongs without doubt to the *meridionalis*-group. The ground colour of the fore wings is not that of typical *meridionalis*, but a little paler, ombre-brown. I do not consider this, however, of much importance. The specimen figured is a male, the paler of the two sexes in *meridionalis*, and the tint of the fore wings is, of course, liable to some variation. The ground colour of the hind wings is the typical rosy-red of *meridionalis*. The only character that really distinguishes *kroumira* from *meridionalis* is the spotting of the hind



wings. Whereas the latter shows a row of heavy black spots along the margin, the Tunesian form has only very few (in the type 3) and small ones. Draudt (Seitz, vol. 2, Suppl., p. 75, 1931) also only considers the markings of the hind wings as the distinguishing feature of *kroumira*.

In order to avoid a multiplication of names and to have a definite use for the name. I propose to use it for all specimens of *meridionalis* with strongly reduced black marginal spotting of the hind wings, but otherwise typical. The form of course strongly reminds of f. *lurida*, which is also as a rule feebly spotted, but it lacks the pale ground colour of the latter. It proves, moreover, that among specimens of extreme southern origin, the ground colour is not always pale, and that it is wrong to lump all the southern examples together as f. *lurida*<sup>1</sup>.

Oberthür writes nothing particular about the Tunesian form, so we do not know, if he had much material from that country and if all specimens belonged to *kroumira*. In vol. 5 of the Lép. Comp., where he treats *fuliginosa* more fully, he only says (p. 74, 1911): «En Algérie, il y a des exemplaires extrêmement clairs, comme en Turkestan. M. Harold Powell a pris en juin d'abord, puis en août et septembre, aux environs de Géryville, quelques *Fuliginosa* dont les ailes supérieures sont d'un blond doré et les inférieures d'un rose clair, avec très peu de taches noires; j'ai d'abord cru à une forme un peu stable, mais j'ai sous les yeux des échantillons des Alpes-Maritimes, de Corse et des Pyrénées-Orientales qui sont tout à fait conformes à ceux de Géryville et dès lors il me semble qu'il y a autre chose à faire qu'à constater l'extrême variabilité de *Fuliginosa* dans la même lieu.»

Here Oberthür clearly describes f. *lurida*, but he does not mention the specimens of Aïn-Draham (because they are less extreme!), nor the name of *fervida* Stgr. (probably because it was not figured by Staudinger).

6. f. **antero-fulvescens** nov. (Pl. I, fig. 15). Ground colour of the

<sup>1</sup> Another southern form with dark fore wings is subsp. *melitensis* Bang-Haas (Horae Macrolep., I, p. 59, pl. 8, fig. 8, 1927) from Malta, strongly related to the *meridionalis*-group, but distinguished by the sharply contrasting large dark spot at the end of the cell on the fore wings. This character seems to be racial on Malta. The hind wings are rosy with strong marginal spots, so of the *meridionalis*-type, but the twin spots are joined in the shape of a seven.



fore wings yellowish-brown, the hind wings of the normal clear reddish *meridionalis* colour with large black spots.

I saw this handsome form from Xauen, El Ajmas (Spanish Marocco), but it no doubt may occur elsewhere among true *meridionalis*.

#### IV. PHRAGMATOBIA FULIGINOSA HARTERI

Rothschild.

Described in: Novitates Zoologicae, vol. 35, p. 229, 1929. *Original description*: «Differs from *P. f. kroumira* Oberth. in its larger size, deeper coloration, the fore wings brighter golden cinnamon brown and the hind wings deeper salmon crimson; the black spots on the hind wings are also larger. Expanse *f. harteri* 38-47 mm; *f. kroumira* 30-40 mm. 16 ♂ ♂ El Hadjeb, W. Slopes of Middle Atlas, 23-29 May 1927.»

Although this form is no doubt strongly related to subsp. *meridionalis*, it is distinguished by its size and from the number of specimens captured it seems to represent a true geographical form.

In this study I have treated the western forms of *Phragmatobia fuliginosa* L., as far as this was possible to me. In conclusion I thank those who were kind enough to assist me in some way or another: Señor R. Agenjo (Madrid) for the loan of Spanish specimens and for adding figures of Spanish examples to the plate, Herrn A. Bang-Haas (Dresden-Blasewitz) for the loan of the 3 *fervida* types from the Staudinger-collection, Mr. J. R. Caron (Hilversum, Holland) for the loan of his interesting *fuliginosa*-series from different European localities and Mr. F. Nordström (Stockholm) for information on the Swedish forms of *fuliginosa* and on Uddman's work, which I could not consult in Holland.

#### Appendix.

*Phragmatobia placida* Frivaldsky is considered by some authors a separate species, by others a form of *Phragmatobia fuliginosa* L. As its habitat partially coincides with that of *Phr. ful. meridionalis* Tutt, it was desirable to settle this question definitely. Unfortuna-



tely, I could only dispose of one specimen of *placida* Friv., a male from Malatia (Western Asia Minor).

As the figures show, the male genitalia of *Phragmatobia* are rather simply built. The valves are somewhat boat-shaped and in the preparations the two halves cover each other for the greater part. On either side of them is a thorn-like projection. The penis shows

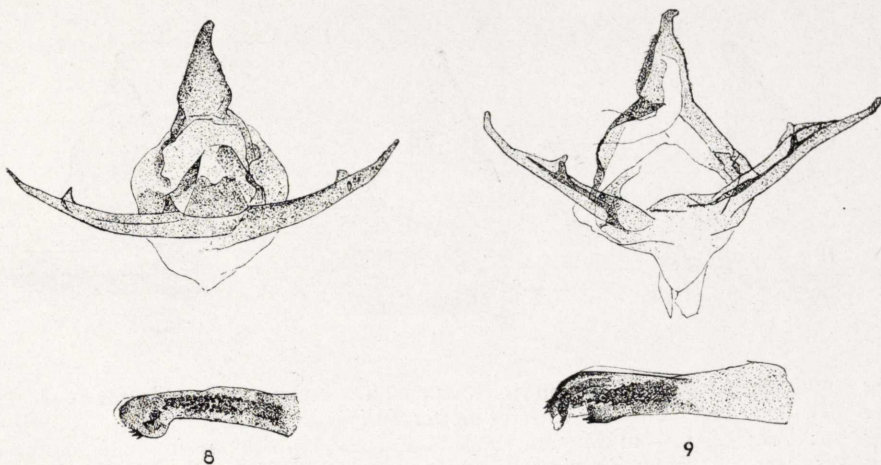


Fig. 8.—Male genitalia of *Phragmatobia fuliginosa fuliginosa* L. (Soest, Holland).—Fig. 9: Male genitalia of *Phragmatobia placida* Friv. (Malatia.)

at its distal end two small groups of thorns: proximately a group of two and distally a group of three. The vesica is provided with a large number of thorns. All these characters are the same in *placida* (Fig. 9) as well as in *fuliginosa* (Fig. 8). The only differences I could discover are:

1. The top of the uncus is clearly bent in *placida*, but not in *fuliginosa*.

2. The penis of *placida* is clearly larger than that of *fuliginosa*.

It might, of course, be possible, that these differences are not specific, but racial. I have, therefore, not only prepared a Dutch specimen of *fuliginosa*, but also my Italian one from Marina di Massa (Fig. 11), a Spanish one from Reocín (Santander) (Fig. 12) and a specimen of *Phragm. fuliginosa pulverulenta* Alph. from Juldus (Kuldscha) (Fig. 10). Although there is considerable variation in the shape of the uncus-top and of the penis, all *fuliginosa* forms are clearly separable from *placida* by the two characters indicated. (It would, of course, be interesting to investigate, if *Phr. fuliginosa* shows racial differences in the male genitalia. The very blunt uncus-top of subsp.



*pulverulenta*, compared with the narrow one of the Italian specimen of subsp. *meridionalis*, points to such a tendency, but the material I dispose of to dissect, is much too small). I therefore conclude, that *Phragmatobia fuliginosa* L. and *Phragmatobia placida* Friv. are two distinct species though closely allied<sup>1</sup>.

*Phragmatobia placida* bears a striking resemblance to *Phr. fuli-*

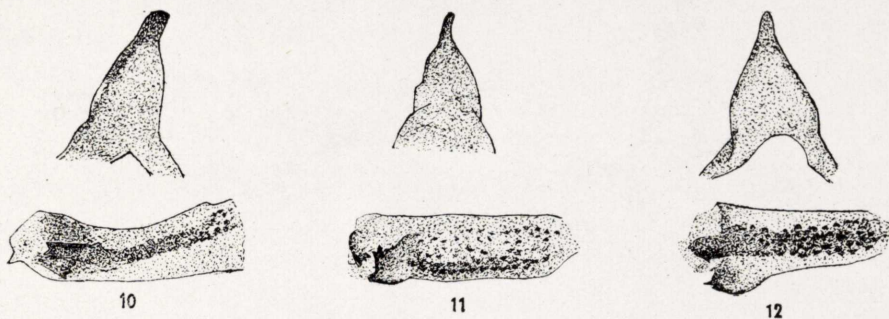


Fig. 10: Prep. 251 from Juldus, Kuldsha (subsp. *pulverulenta* Alph.).—  
Top of uncus and penis of *Phragmatobia fuliginosa* from different localities:  
Fig. 11: Prep. 246 from Marina di Massa, Italy (subsp. *meridionalis* Tutt).—  
Fig. 12: Prep. 247 from Reocin, prov. of Santander, Spain (subsp. *fuliginosa* L.).

*ginosa meridionalis* Tutt, but is of course easily distinguished by the red discal spot on the fore wings. It is mainly an eastern species, reaching, according to Rebel (*Berges Schmetterlingsbuch*, 9th ed., p. 427, 1910) as far west as Bosnia. Stauder (*Ent. Anz.*, vol. 10, p. 106, 1930) mentions *placida* from the Dinara Massive in Dalmatia. The most remarkable locality is no doubt the French one Saint-Martin-Lantosque (Alpes Maritimes), mentioned by Millière in his *Lépidoptérologie*, fasc. 6, p. 5, 1880. As this statement seems to have attracted but little attention, I fully copy the passage:

«La *Spilosoma Placida* du Dr. Frivaldsky, se distinguerait à peine de la *Fuliginosa* type, n'était le petit point rouge qui surmonte la tache cellulaire noire placé sur les ailes supérieures. L'envergure de *Placida* est grande, il est vrai, mais ce développement des ailes, on le remarque quelquefois chez les *Fuliginosa* ordinaires, dont *Placida* présente la même coupe d'ailes et la même coloration générale.

Cette race appartient à la Turquie et à l'Asie mineur, mais rien

<sup>1</sup> It will, however, be necessary to examine with more material, if the differences I mentioned, are stable.



ne me surprendrait de la rencontrer dans nos montagnes provençales si peu connues des lépidoptérogues.

*Obs.* Mes prévisions à l'égard de cette variété constante semblent aujourd'hui se confirmer, en partie toutefois. Le 21 août 1880, à neuf heures du soir, un beau ♂ de *Placida* Friv. a été capturé à mon réflecteur de Saint-Martin-Lantosque. Cependant je dois dire que si, chez ce sujet, l'un des deux points de l'aile antérieure est d'un rouge vif aussi prononcé que chez la *Placida* de Turquie, les secondes ailes rappellent le type par ces larges taches noires<sup>1</sup> et, les antennes sont grises et non pas noires ainsi qu'on le voit chez la Var. *Placida*.»

Millière gives an excellent figure of *placida*, l. c., pl. VIII, fig. 5, without stating, however, if this is drawn from his French specimen or from a foreign one. There is one difficulty, viz. the colour of the antennae. In *Phr. fuliginosa* they are on the upper side white, on the under side dark brown. The only specimen of *Phr. placida*, that I have at my disposal, has them unicolorously brown. But among my series of Dutch *fuliginosa* there are also two with the antennae of the same uniform dark brown colour! We may, therefore, not attribute too high a value to the colour variation of the antennae of Millière's French specimen of *placida* and safely conclude, that he took this species indeed in the Alpes Maritimes in 1880. The only strange thing is, that the species have never been met with there afterwards, nor in the districts between the French Alps and Dalmatia. But that is no reason to doubt Millière words!

### Explanation of Plate I.

Fig. 1.—*Phragmatobia fuliginosa fuliginosa* (L.) f. *pseudoborealis* Lpk., ♂. Holotype. Miño, Coruña, España, VIII-1940. Coll. Agenjo.

Fig. 2.—*Phragmatobia fuliginosa fuliginosa* (L.) f. *typica-intermedia* Lpk., ♂. Holotype. Estépar, Burgos, España, VIII-1930. Coll. Agenjo.

Fig. 3.—*Phragmatobia fuliginosa fuliginosa* (L.) f. *typica-marginata* Lpk., ♂. Holotype. Estépar, Burgos, España, VII-1932. Coll. Agenjo.

Fig. 4.—*Phragmatobia fuliginosa fuliginosa* (L.) f. *fuliginosa* L., ♂. Miño, Coruña, España, VIII-1940. Coll. Agenjo.

Fig. 5.—*Phragmatobia fuliginosa fuliginosa* (L.) f. *posthyalina* Lpk., ♂. Holotype. Reocín, Santander, España, VIII-1940. Coll. Agenjo.

<sup>1</sup> These words clearly prove, that the «type» of Millière is nothing but *P. ful. meridionalis* Tutt.



Fig. 6.—*Phragmatobia fuliginosa fuliginosa* (L.) f. *intermedia* Tutt., ♂. Reocín, Santander, España, VIII-1940. Coll. Agenjo.

Fig. 7.—*Phragmatobia fuliginosa fuliginosa* (L.) f. *brunnea-punctata* Lpk., ♂. Holotype. Gijón, Oviedo, España, VIII-1942. Coll. Agenjo.

Fig. 8.—*Phragmatobia fuliginosa fuliginosa* (L.) f. *brunnea-intermedia* Lpk., trans *brunnea-pseudoborealis* Lpk., ♂. Reocín, Santander, España, VIII-1940. Coll. Agenjo.

Fig. 9.—*Phragmatobia fuliginosa fuliginosa* (L.) f. *brunnea-intermedia* Lpk., ♂. Holotype. Reocín, Santander, España, IV-1940. Coll. Agenjo.

Fig. 10.—*Phragmatobia fuliginosa fuliginosa* (L.) f. *brunnea-marginata* Lpk., ♂. Holotype. Puente Viesgo, Santander, España, VII-1929. Coll. Agenjo.

Fig. 11.—*Phragmatobia fuliginosa fuliginosa* (L.) f. *brunnea* Lpk., ♂. Holotype. Camargo, Santander, España, VII-1929. Coll. Agenjo.

Fig. 12.—*Phragmatobia fuliginosa fuliginosa* (L.) f. *brunnea-posthyalina* Lpk., ♂. Holotype. Reocín, Santander, España, VIII-1941. Coll. Agenjo.

Fig. 13.—*Phragmatobia fuliginosa fuliginosa* (L.) f. *brunnea-salmonicolor* Lpk., ♂. Paratype. Miño, Coruña, España, VIII-1939. Coll. Agenjo.

Fig. 14.—*Phragmatobia fuliginosa meridionalis* Tutt., ♂. Puente Viesgo, Santander, España, VIII-1941. Coll. Agenjo.

Fig. 15.—*Phragmatobia fuliginosa meridionalis* Tutt., f. *antero-fulvescens* Lpk., ♂. Holotype. El Ajmas, Xauen, Marruecos Español, VIII-1932. Coll. Instituto Español de Entomología.

(Tamaño natural.)

Fig. 16.—*Phragmatobia fuliginosa meridionalis* Tutt, ♂. Marina di Massa, Italia, 12-IV-1937. Coll. Lempke.

Fig. 17.—*Phr. fuliginosa fuliginosa* L., f. *brunnea* Lpk., ♂. Soest. Holland, 12-IX-1934. Coll. Lempke.

Fig. 18.—*Phr. fuliginosa fuliginosa* L., f. *typica-intermedia* Lpk., ♂. Meerssen, Holland, 29-VII-1937. Coll. Lempke.

Fig. 19.—*Phr. fuliginosa meridionalis* Tutt, f. *lurida* Rothschild, ♂. Type of f. *fervida* Stgr. Granada, 13-8. Coll. Staudinger.

Fig. 20.—*Phr. fuliginosa meridionalis* Tutt, f. *lurida* Rothschild, ♀. Type of f. *fervida* Stgr. 4-4. Coll. Staudinger.

Fig. 21.—*Phr. fuliginosa meridionalis* Tutt, f. *lurida* Rothschild, ♀. Type of f. *fervida* Stgr. (No data.) Coll. Staudinger.





B. J. LEMPKE: On some forms and races of *Phragmatobia fuliginosa* (L.).



